

A NEW GENUS OF MAYFLIES FROM NORTH AMERICA (EPHEMEROPTERA: HEPTAGENIIDAE)¹

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ABSTRACT—The genus *Stenonema* Traver is divided into two genera, *Stenonema* and *Stenacron* Jensen n. gen. on the basis of phylogenetic studies. Species included in *Stenacron* are *S. arcion* (Burks), n. comb.; *S. canadense* (Walker), n. comb.; *S. candidum* (Traver), n. comb.; *S. carolina* (Banks), n. comb.; *S. frontale* (Banks), n. comb.; *S. gildersleevei* (Traver), n. comb.; *S. heterotarsale* (McDunnough), n. comb.; *S. interpunctatum* (Say), n. comb.; and *S. minnetonka* (Daggy), n. comb. Descriptions and diagnostic characteristics of the male imago and nymphs of *Stenacron* are provided.

In naming the genus *Stenonema*, Traver (1933a) recognized three species groups: *tripunctatum*, *vicarium* and *interpunctatum*. At the time, Traver noted that the *interpunctatum* group was quite widely remote from the other two closely related groups and possibly worthy of generic rank. Subsequent studies by Spieth (1947), Berner (1950), Koss (1968), and Jensen and Edmunds (1973) indicated that the *interpunctatum* group appeared more closely related to *Heptagenia* and *Ecdynourus* than to *Stenonema*. I am removing the group from *Stenonema* and naming it as a separate genus.

Stenacron Jensen, new genus

Nameless, Eaton, 1885 (1883–88):pl. 57.

Nymph No. 1, *generis incerti*, of the *Ecdyurus* type, Eaton, 1885 (1883–88):262.
Ecdyonurus, in part, *interpunctata* group, Spieth, 1933:332.

Heptagenia, in part, Clemens, 1913:249.

Stenonema, in part, *interpunctatum* group, Traver, 1933a:173; Traver, 1933b:113;
Traver, 1935:259; Spieth, 1947:87; Burks, 1953:161; Berner, 1950:56; Koss,
1968:704; Landa, 1969:299.

New Genus "A," Jensen and Edmunds, 1973:83.

Male imago: Lengths, body 7–11; forewing 8–12 mm. Eyes moderate to large, separated dorsally by width 1.2 to much greater than median ocellus, sometimes widely separated; frontal margin of head moderately produced ventrally, evenly convex or with shallow V-shaped median emargination. Forewings (fig. 1) with basal costal crossveins well developed, stigmatic crossveins slightly slanted; crossveins between veins R_1 – R_2 below bullae thickened with black pigmentation, often connecting 2 or more crossveins. Hind wings with obtuse costal projection; 3 inter-

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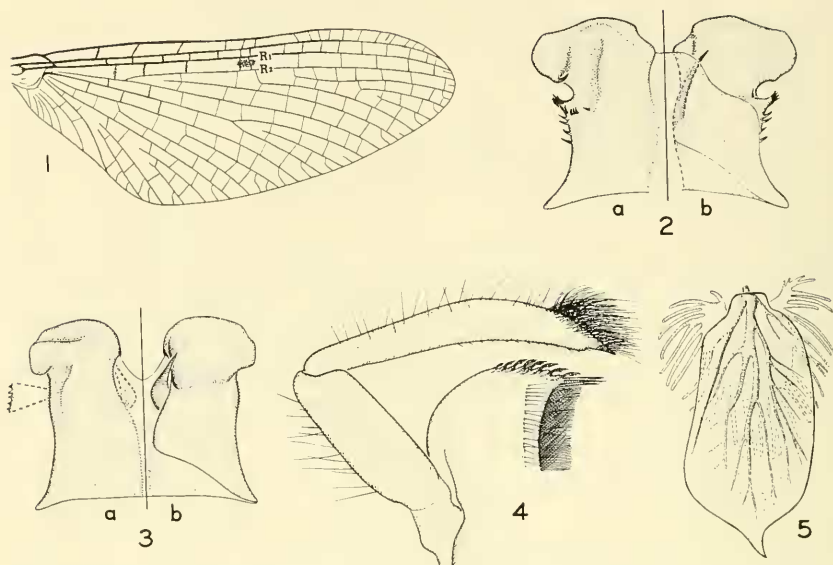


Fig. 1. Forewing, male imago, *Stenacron interpunctatum*. Fig. 2-3. Penes, male imago, a = dorsal view, b = ventral view. 2, *S. canadense*. 3, *S. carolina*. Fig. 4. Maxilla, nymph, *Stenacron* sp. Fig. 5. Abdominal gill 4, nymph, *Stenacron* sp.

calaries in cubital region; length 0.30-0.34 as long as forewing. Forelegs variable in length, shorter to much longer than body; foretibiae 1.1-1.2 times length of femora; tarsi 1.2-2.1 times length of femora, 1.1-1.7 times length of tibiae; tarsal segments in order of descending lengths = 2, 3, 4, 1, 5 or 2 = 3, 4, 1, 5 or 3, 2, 4, 1, 5; basal foretarsal segment 0.25-0.66 as long as segment 2 (in most species 0.50-0.66). Hind legs with tibia 0.8-0.9 as long as femora; tarsi 0.3-0.5 as long as femora, 0.4-0.6 as long as tibiae; tarsal segments in order of descending lengths = 5, 2, 3, 1, 4. Claws of all legs dissimilar. Genitalia with posterior margin of subgenital plate evenly convex, concave, or with posteromedian conical projection, penes (fig. 2-3) fused medially in basal 0.50-0.66, expanded apically, with cluster of spines on lateral margins (well developed in most species, very small in *S. carolina* [fig. 3] and *S. candidum*); median titillators well developed, curved. Cerci 2.2-3.0 times length of body.

Mature nymphs: Lengths, body 8-13; caudal filaments 10-18 mm. Head capsule 1.3-1.4 times as wide as long; anterior margin evenly convex or with very shallow U-shaped median emargination, with or without sparse setae; lateral margins evenly convex, without setae; posterior margin with broad, shallow U-shaped median emargination. Left mandible with incisors serrate, subequal in length, outer incisor thicker; lacinia consisting of single stout seta. Right mandible with outer incisor serrate, inner incisors acute; lacinia consisting of a small tuft of setae; lateral margins of both mandibles setaceous. Labrum 0.45-0.60 as wide as head capsule; anterior margin with shallow, broad U-shaped median emargination, long seta, short stout spines on ventral surface. Maxillae (fig. 4) with armature on crown of galea-lacinia consisting of pectinate spines; ventral surface of galea-lacinia

with submedian row of setae; basal segment of palpi with long sparse setae; apex of apical segment acute; apical segment 1.9–2.1 times length of basal segment. Labium with V- or Y-shaped separation between glossae; paraglossae moderately expanded laterally; apical segment of palpi 0.7–0.9 as long as basal segment. Hypopharynx with lingua conical at apex; superlingua distinctly developed laterally, sparsely setaceous. Prothoracic notum widest anterolaterally; posterior margin with U-shaped median emargination. Forelegs with small stout spines on anterior (leading) margin and dorsal surface of femora, posterior margin with long slender spines and sparse setae; tibiae and tarsi with sparse setae, small spines may be present on tibiae; tibiae 1.0–1.2 times length of femora; tarsi 0.25–0.40 as long as femora, 0.25–0.33 as long as tibiae. Middle and hind legs similar to forelegs in armature; hind legs with tibiae 0.90–0.97 as long as femora; tarsi 0.25–0.30 as long as femora, 0.27–0.31 as long as tibiae. Claws without subapical denticles. Gills on abdominal segments 1–6 (fig. 5) with lamellae subquadrate, terminating in acute point, fibrilliform portion well developed; gills on segment 7 with lamellae reduced to slender filament, sparsely setaceous, tracheae with 0–2 lateral branches, fibrilliform portion absent. Abdomen with posterolateral projections absent on segments 1–6, small on 7, moderately developed and acute on 8–9. Three caudal filaments with long lateral intersegmental setae; whorls of stout spines and long setae at articulation of each segment in basal $\frac{1}{3}$, long setae only in apical $\frac{2}{3}$.

Type species: *Stenacron interpunctatum* (Say), n. comb. (originally in *Baetis*). The following species are also transferred to *Stenacron*: *S. areion* (Burks), n. comb.; *S. canadense* (Walker), n. comb.; *S. candidum* (Traver), n. comb.; *S. carolina* (Banks), n. comb.; *S. frontale* (Banks), n. comb.; *S. gildersleevei* (Traver), n. comb.; *S. heterotarsale* (McDunnough), n. comb.; and *S. minnetonka* (Daggy), n. comb.

Stenacron apparently originated from a *Heptagenia*-like ancestor and this line in turn differentiated into *Stenacron* and *Stenonema*. *Heptagenia* is widely distributed throughout the Holarctic and extends into the Oriental and Neotropical. *Stenonema* is mostly distributed in eastern North America with some species extending into Central America and some in western North America. *Stenacron* is apparently restricted to central and eastern North America. *Stenacron* and *Heptagenia* share several character states, the most notable being pectinate spines on the maxillae of the nymphs (fig. 4) which are absent in *Stenonema*, and similarity of structure of the eggs while those of *Stenonema* are unique for the family (Koss, 1969). The nymphs of *Stenacron* and *Stenonema* have similar gill structure, especially the gills on abdominal segment 7, except for the crown of the maxillae, very similar mouthparts, and the male imagoes have similar tarsal ratios.

Male imagoes of *Stenacron* can be distinguished from those of *Heptagenia* or *Stenonema* by the presence of dark pigmentation below the bullae between veins R_{1-2} of the forewings (fig. 1), (species of *Heptagenia* or *Stenonema* may have crossveins below the bullae clouded but not in the same manner as described for *Stenacron*), and the shape of the penes and presence of usually well developed lateral subapical

cluster of spines on the penes (fig. 2-3). Nymphs of *Stenacron* can be distinguished from *Stenonema* and *Heptagenia* by the following combination of characters: pectinate spines on the crown of the galealacinia of the maxillae (fig. 4), gills on abdominal segments 1-6 with lamellae terminating in an acute point (fig. 5), and gills on segment 7 reduced to a slender filament with the fibrilliform portion absent and the tracheae with few or no lateral branches.

REFERENCES

- Berner, L. 1950. The mayflies of Florida. Univ. Florida Stud., Bio. Sci. 4:i-xii + 267 pp., 88 figs., 24 pls., 19 maps.
- Burks, B. D. 1953. The mayflies or Ephemeroptera of Illinois. Bull. Illinois Nat. Hist. Surv. 26(1):i-v + 216 pp., 395 figs.
- Clemens, W. A. 1913. New species and life histories of Ephemeridae or mayflies. Canad. Entomol. 45:246-262, 329-341.
- Eaton, A. E. 1885 (1883-88). A revisional monograph of recent Ephemeridae or mayflies. Trans. Linn. Soc. London, Sec. Ser. Zool. 3:1-352.
- Jensen, S. L. and G. F. Edmunds, Jr. 1973. Some phylogenetic relationships within the family Heptageniidae. Proc. 1st Int. Conf. Ephemeroptera, 1970. p. 82-87, 1 fig.
- Koss, R. W. 1968. Morphology and taxonomic use of Ephemeroptera eggs. Ann. Entomol. Soc. Amer. 61:696-721.
- . 1969. Ephemeroptera eggs and their contribution to phylogenetic studies of the order. Ph.D. thesis, Univ. Utah. i-viii + 240 pp., 232 figs.
- Landa, V. 1969. Comparative anatomy of mayfly larvae (Ephemeroptera). Acta Entomol. Bohemoslov. 66:289-316.
- Spieth, H. T. 1933. The phylogeny of some mayfly genera. J. New York Entomol. Soc. 41:55-86, 327-391.
- . 1947. Taxonomic studies on the Ephemeroptera IV. The genus *Stenonema*. Ann. Entomol. Soc. Amer. 40:87-122.
- Traver, J. R. 1933a. Mayflies of North Carolina part III. The Hepatogeniinae. J. Elisha Mitchell Sci. Soc. 48:141-207.
- . 1933b. Heptagenine mayflies of North America. J. New York Entomol. Soc. 41:105-125.
- . 1935. Systematic, part II, pp. 267-739. In: Needham, J. G., J. R. Traver, and Y.-C. Hsu, The Biology of Mayflies. Ithaca; Comstock Publishing Co., i-xvi + 759 pp.